Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PAPERS

IN

MECHANICKS.

MECHANICKS.

The GOLD MEDAL of the Society was this Session voted to the Rev. DANIEL PAPE, of Penn, near Wolverhampton, for IMPROVING RYE HARBOUR.

The following ACCOUNT was received from him; and an ENGRAVING of the Plan, with a DESCRIPTION thereof, are hereunto annexed.

SIR,

I HEREWITH transmit you a Plan of a Dam and Cut executed at Rye, which, if you will have the goodness to present to the Society of Arts, for their approbation and bounty, you will very much oblige your obedient servant,

DANIEL PAPE,
Late Curate of Rye.

London, April 6, 1803.

CHAS. TAYLOR, Esq.

Memorial of Rye Harbour.

Rye Harbour, once so very safe and convenient for passing vessels up or down the channel, to run to in distress or in precarious weather, had been for many years, and from various causes, in a gradual state of decay, insomuch that in the years (I believe) 1795 and and 1796, it was thought necessary to send Captain ———, from the Trinity-House, to make a survey, and report to the Board its then state, and the probability of its improvement or redemption. The survey was made, I believe, with considerable care and attention; and the result was, that the harbour was pronounced lost, or in such an irreparable decayed state, that it was an useless expense to the ships passing, which paid tonnage to it; and therefore this tonnage was taken from Rye, and given to Ramsgate Harbour, leaving however a reserve

a reserve in the hands of the Commissioners of £6000.

The consequence of this was an advertisement, inviting any gentleman to come forward with plans for the improvement of the Harbour, and the draining of the upper Levels. On the day appointed for the presentation of such plans, a very sensible letter was laid before the Commissioners by the Rev. Mr. Jackson, of Rye, though impracticable on many accounts,—and also a plan by myself, proposing to make the present cut, and to form a dam of straw or hay and faggots, as represented on the chart, for the small sum of £500. On reverting to the *enormous sums* that had been already, from time to time, expended by able engineers to no purpose, it was judged at the moment an impossible attempt; and, after politely voting me their thanks, the Commissioners seemed to decline carrying their plan into execution.—

This, however, did not satisfy me; and therefore, confident of success, I undertook to perform what I had proposed, or lose the money, without stipulating for any fee or reward should I succeed. On entering upon this agreement, I set to work, and choosing a Mr. Southerden, an active and persevering man, as foreman, to assist me, I completed the work in three months, in the very depth of winter, at the expense of only £480. though the works were twice filled up with sea-beach by the tides. But, though this was done to the astonishment and admiration of many, yet there were evidently an envious few mortified and disappointed. The cut and dam being thus finished, it was then thought necessary, on my recommendation, to secure the cut from reverting to its late reduced state, by a pier-head on the East, and jutties on the West side of it; the execution of which was committed to the eminent skill of a Mr. Sutherland,

who

who performed the trust reposed in him, to the universal satisfaction of his employers; and I believe the whole was completed for something less than £3000, in a very masterly and workman-like manner. Of this I think there cannot be a better proof adduced, than that it still stands *firm*, without the least apparent decay, and maintains its first position without the smallest variation; and no doubt a very trifling annual expense will keep it in its present improved state.

The advantages derived from it are particularly great; for ships of 250 tons burden, and even vessels of 300 tons, run in with the greatest safety at spring tides; whereas, before, those of 50 tons could not come in, but with the utmost difficulty and danger.

That part of Romney Marsh too, which lies contiguous, and was threatened by every boisterous tide with a total overflow, is now in safety, and

the drainage of the levels is rendered complete.

I beg leave now to offer to your attention a short description of the Dam, the form and materials of which may be used with success in similar situations, whether in places adjacent to the sea, or in gentlemen's fish-ponds, or rivers in the country, where weirs may be necessary for the preservation of the banks. The dam was merely formed of hay, straw, and faggots, pinned down to a *foundation* of *sand* or *silt* by short piles. I formed it as in the chart, of the shape of a double-roofed house, first putting down straw, and then over it hazel faggots, from 12 to 14 feet in length, and afterwards pinning down the whole with piles. I next filled the space between the two roofs with gravel or sea-beach, and secured this also with faggots pinned down upon it, over which resistance being precluded from its peculiar form, the influx and reflux of the

Pl.v

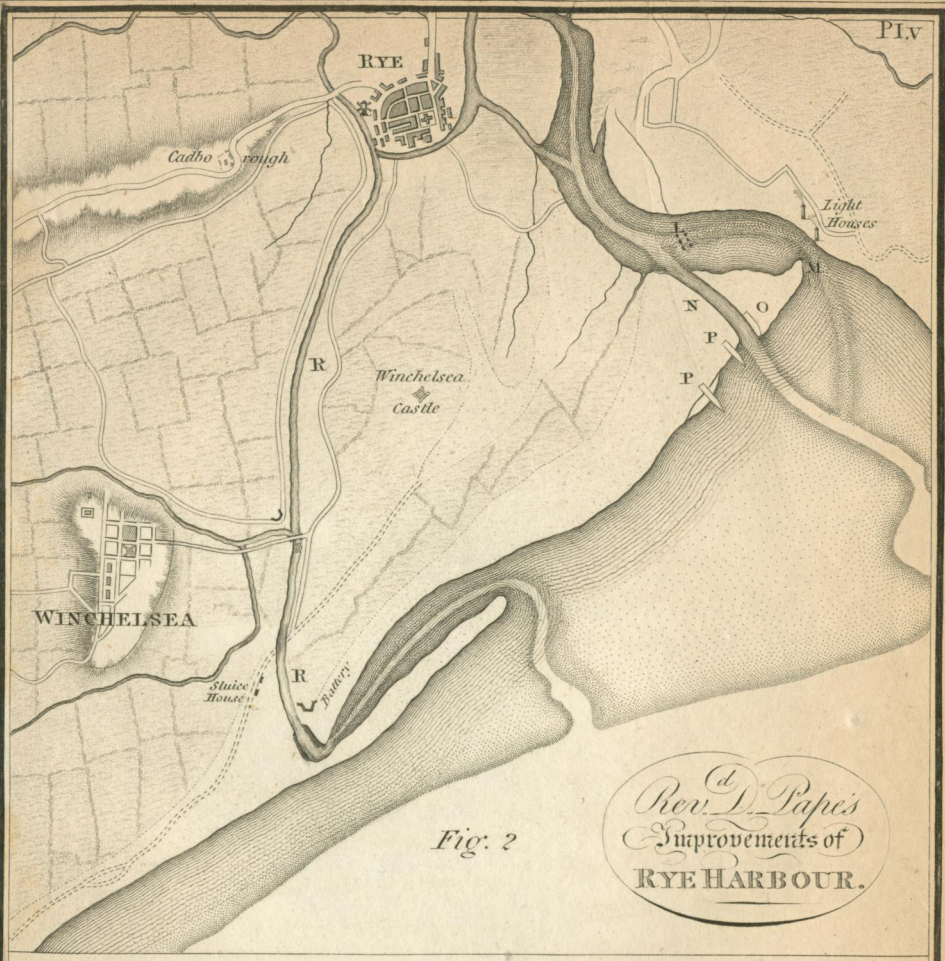
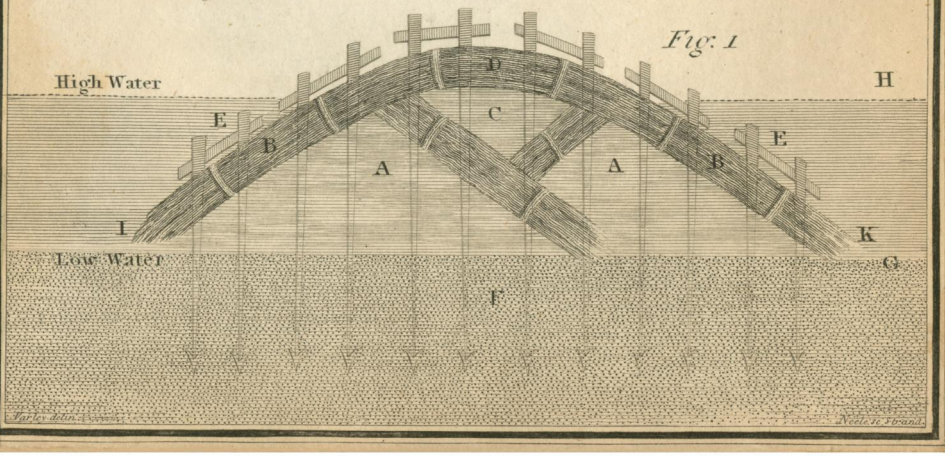


Fig: 2

Rev.d D. Papes Improvements of RYE HARBOUR.

Cross Section of Mr. Papes Dam.

Fig: 1



the tides glided so gently, that consequently every probability, not to say possibility, was annihilated of its being ever undermined or blown up.

It was also necessary that this dam should be put down in one tide, and that the mouth of the cut should be opened in the same time; for it was evident to me, that it was impossible ever to cut to sea in any other way. For unless the dam had been ready to turn the water through the cut as soon as opened, and the cut, on the other hand, ready to receive the current the moment the dam began to act, the whole work must have been entirely and unavoidably destroyed by the influx and reflux of the ensuing tide. All this I clearly foresaw; and by procuring a sufficient number of men, nearly three hundred, the business was completely finished, just as the tide touched the the foot of the dam; and when it was full sea, the straw of course acted as a

receiver and retainer to the *silt* brought in by the tide; which being repeated by each returning tide, the dam soon became entirely fixed, beyond a possibility of ever being destroyed; and it is now so entirely covered, that if the pier is kept in repair, the dam must ever remain unimpaired by time, and proof against the most violent floods of waters.

For this work, the Commissioners voted me fifty guineas (half of which I gave to my assistant), and alleged that, on account of the loss of the tonnage, and the poverty of the fund, they were sorry it was not more. This to me, under these circumstances, was a sufficient apology, and I was content. I now offer it to the consideration of the Society of Arts, as a body in some degree interested in the prosperity of this kingdom. Should they deem what I have already received an adequate compensation for such a work, and such

an

an undertaking, at so inclement a season, I am still content. But if they should think proper to grant me an additional remuneration, it will be received with peculiar satisfaction, and considered as a very great honour by,

SIR,

Your obedient humble servant,

DANIEL PAPE.

Cambridge, Trinity Hall, April 2, 1803.

CHARLES TAYLOR, Esq.

I HEREBY certify, that I occasionally lived at Rye, and am acquainted with Rye Harbour, and with the Rev. Mr. Pape, whose Memorial respecting the Cut and Dam at that place I have read, and believe what he has therein related to be strictly true.

DANIEL SLADE.

Three-Crown Court, Southwark,
April 6, 1803.

Reference

Reference to the Engraving of the Rev. Mr. PAPE's *Improvement of Rye Harbour, Plate* 5, *Fig.* 1.

AA. The double roof, filled with straw.
BBB. Hazel faggots, 12 to 14 feet long.
C. The space betwixt the roofs, filled with gravel or sea-beach.
D. The faggots which covered the gravel so laid.
EE. Piles of wood driven through the faggots and straw into the earth, at the bottom of the river, the heads of which piles are united by cross pieces of wood.
F. The solid bed of the river.
G. The river at low water.
H. The high-water mark.
I. The upper side of the dam, which opposes the current of the river.
K. The lower side of the dam, which resists the coming-in of the tide.
Fig. 2. L, Shows the place where the dam was placed.

M The

M. The old course of the river represented by dotted lines, and which is now filled up with gravel by the tide.

N. The new canal, cut by Mr. Pape's directions, and which is now the regular channel for shipping.

O. The pier-head, on the East side of Mr. Pape's cut.

PP. The two jutties, on the West side of Mr. Pape's cut.

RR. The former canal, cut under the direction of Mr. Smeaton, and other able engineers; but which failed, and is since blocked up by a bank made across it, over which the present high road between Rye and Winchelsea passes.

The GOLD MEDAL of the Society was this Session voted to Capt. JOSEPH BRODIE, of the Royal Navy, at Leith, for sundry MARINE IMPROVEMENTS, particularly for his method of connecting Iron Bars, and coating them with lead, so as to form solid pillars for Light-houses, on rocks covered at high water, without being subject to corrosion from the action of sea water.

An ENGRAVING of this Invention is hereunto annexed. A MODEL thereof, also of a cone or break-water, of cast iron, invented by him, are reserved in the Society's Repository.

SIR,

AS the meetings of the Society are now about to take place, I request you will have the goodness to present my models to them; the one, which is for a purposed Light-house, will show the

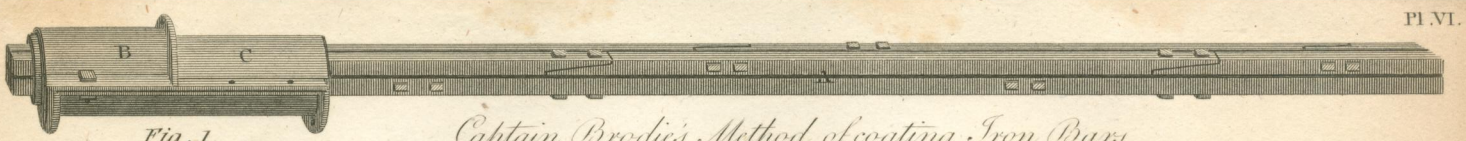


Fig. 1.

Captain Brodie's Method of coating Iron Bars.

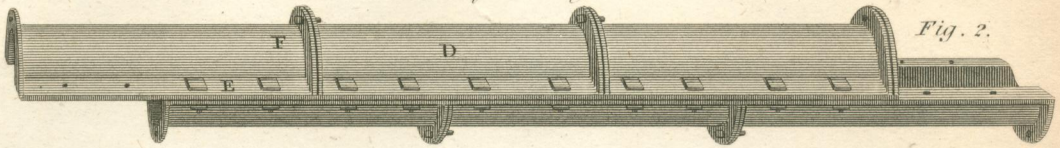


Fig. 2.

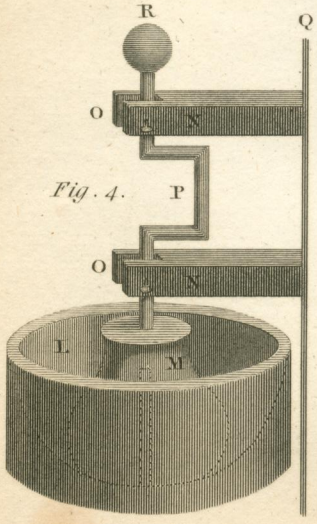


Fig. 4.

Improved Indigo Mill.

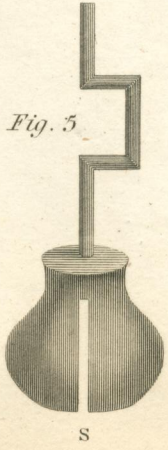


Fig. 5

Mr. Rawlinson's Colour Mill.

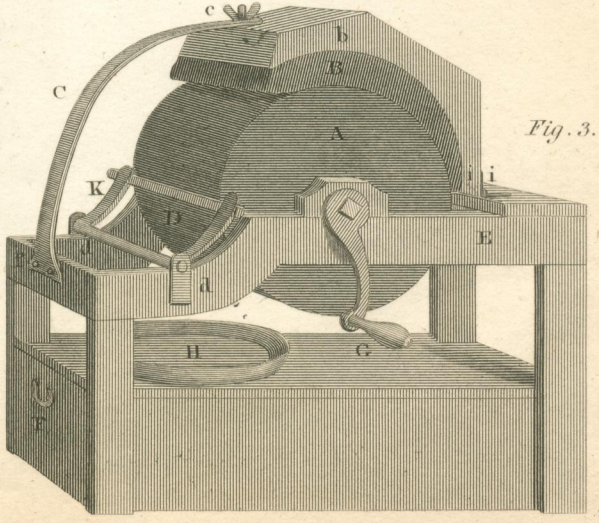


Fig. 3.

C. Varley del.

S. Porter sculp.

the practicability of preserving iron from corrosion in any situation, and also how light and strong beams of cast iron may be easily constructed for other purposes.

My plan for building cones, piers, moles, or break-waters, would be of the greatest use in Plymouth Sound, Cawsand Bay, and Torbay, and in two places on the Scotch coast. The model will show the practicability, and with what dispatch a bason or harbour might be formed in ten or twelve fathom water, in any situation where the bottom is not a quicksand. I have made several other useful discoveries; what they have cost me, I am ashamed to mention. The intention of the Society is to be of service to this country, and mine has ever been the same.

I have the honour to be, Sir,

Your obedient Servant,

Leith, October 20. JOS. BRODIE.

Mr. CHAS. TAYLOR.

Reference

Reference to the Engraving of Captain BRODIE'S *method of connecting Bars of Cast Iron, and coating them with lead. Plate* 6, *Fig* 1, 2.

Fig. 1. A, Sh ws four rods f cast iron, composed of a number of pieces two feet long, rivetted together, in a manner explained by the plate, so as to produce the effect of one bar of the thickness of the whole.

B. A tube of cast iron, formed from a number of separate pieces, each about ten inches long, and which, when placed round the iron rods above mentioned, and then screwed together, form a mould, into which the melted lead is to be poured, to coat the iron rods.

C. A portion of the rods covered with the melted lead, so as to form a cylindrical pillar apparently of lead, the iron being perfectly coated therewith.

Fig. 2.

Fig. 2. D, Shows the manner in which the hollow cylinder is formed to any length required, by the junction of a number of semi-cylinders rivetted together and fitting each other.

E. The side flanges screwed close together.

F. The end flanges also screwed together, as prepared for the melted lead.

After a certain portion of the iron rods are coated with lead, the lower parts of the tube are taken off and placed higher up; by which repeated changes, a few tubes will answer the purpose to coat any length of the iron rods.

The SILVER MEDAL of the Society, and TEN GUINEAS, were this Session voted to Mr. JAMES RAWLINSON, of Derby, for an improved MILL for grinding Painters' Colours.

The following ACCOUNT was received from him: a PLATE and DESCRIPTION are hereunto annexed, and a MODEL of the MILL is placed in the Society's Repository.

SIR,

I HAVE herewith sent a Model of a Machine for grinding Paint, hoping that the Society for the Encouragement of Arts, &c. may not think their time entirely lost in examining if it has any merit; and if they should be of opinion that it has sufficient merit to recommend it to the Public, it cannot fail of receiving that attention, from the sanction of their approbation, which my recom-

recommendation could not procure for it.

The hitherto very unmechanical, inconvenient, and highly injurious method of grinding poisonous and noxious colours, led me first to imagine a better might easily be contrived for that purpose. It must be obvious to every person, that the method hitherto adopted of grinding colours on an horizontal marble slab, with a small pebble muller, requires the body of the person who grinds to bend over that slab, and consequently his head; which causes him constantly to inhale the noxious and poisonous volatile parts of the paint, which is not unfrequently ground with oil saturated with litharge of lead; and if we may judge from the very unhealthy appearance of these men, accustomed to much colour-grinding, it should seem the bad effects of this employment require a speedy remedy.

The Machine, of which I now send the Society a Model, has not only the advantage of being an effectual remedy of this extensive and severe evil to recommend it, but it grinds the colour much easier, much finer, and much quicker, than any method hitherto adopted. Having occasion for a considerable quantity of colour-grinding in the profession in which I am engaged, and that in the finest state possible, and having made use of this machine for several years, and being more and more convinced of its utility, I thought it my duty to present it to the Society of Arts, hoping that it might not be altogether unworthy of their attention. The roller of the machine that I use is sixteen inches and a half in diameter, and four inches and a half in breadth. The concave muller that it works against covers one-third of that roller: it is therefore evident, that with this machine I have seventy-

two

two square inches of the concave marble muller in constant work on the paint, and that I can bring the paint much oftener under this muller in a given space of time, than I could by the usual method with the pebble muller, which is seldom more than four inches in diameter, and consequently has scarcely sixteen square inches at work on the paint, when my concave muller has seventy-two. I do not mean to say that a roller, the size of that which I now use, is the largest which might be employed; for truly I believe that a roller two feet in diameter, with a concave muller in proportion, would not be hard work for a man; and then the advantage to the public would be still farther increased.

This machine will be found equally useful for the colours ground in water, as for those ground in oils; and I doubt not but the great importance of this simple machine will be very

soon generally experienced in all manufactories where colours are used. The labour necessary with this machine, in grinding colours exceedingly fine, is very easy. It is useless to enter into any minute description in this place, as a bare inspection of the machine must sufficiently explain itself.

To the colourman it would evidently be an essential saving of labour, and consequently of expense, which will probably have some weight as a recommendation; and the advantages to the colour-grinder have been already stated.

I am, Sir,

Your very obedient servant,

JAMES RAWLINSON.

Derby, Jan. 10, 1804.

CHARLES TAYLOR, Esq.

SIR,

SIR,

I WAS duly favoured with your letter of the 3d instant; and in reply to the questions that the Committee have proposed, I have made a rough sketch of the Machine, with letters of reference, as supposing this may better explain the process. Plate 6, Fig. 3, A is the roller or cylinder made of any kind of marble; black marble is esteemed the best, because it is the hardest, and takes the best polish. B is the concave muller covering one-third of the roller, and of the same kind of marble, and is fixed in a wooden frame *b*, which is hung to the frame E at *i i*. C is a piece of iron, about an inch broad, to keep the muller steady, and is fixed to the frame with a joint at *f*. The small binding-screw, with the fly nut, that passes through the centre of the iron plate at *c*, is for the purpose of laying more

pressure on the muller, if required, as well as to keep it steady. D is a taker-off, made of a clock-spring about half an inch broad, and fixed similar to a frame-saw in an iron frame *k*, in an inclined position to the roller, and turning on pivots at *d d*. G is a slide-board to draw out occasionally, to clean, &c. if any particles of paint should fall from the roller, and which also forms itself for the plate H, to catch the colour on as it falls from the taker-off. F is a drawer, for the purpose of containing curriers shavings, which are the best things for cleaning paint-mills.—E is the frame.

Previous to the colour being applied to the mill, I should recommend it to be finely pulverized in a mortar, covered in the manner of the chemists when they levigate poisonous drugs.* This process

* Or rather in an improved mill, used at Manchester by Mr. Charles Taylor, for grinding indigo in

process of dry-grinding is equally necessary for the marble slab now in use; after which it should be mixed with oil or water, and with a spatula or pallet-knife put on the roller, near to the top of the concave muller, and the roller turned round, which takes the colour under the muller without any difficulty, and very few turns of the roller spread it equally over its surface. When it is perceived sufficiently fine for the purpose required, it is very easily taken off by means of the taker-off described, which must be held against the roller, and the roller turned the reverse way, which cleans it very quick and very completely; and the muller will only require to be cleaned when you desist or change the colour. It is then turned back, being hung on pinions to the frame at *i i*, and cleaned with a pallet-

in a dry state, of which I have annexed a drawing, and reference, to render the whole business of colour-grinding complete.

knife or spatula very conveniently.—Afterwards, a handful of curriers shavings held on the roller, with two or three revolutions, cleans it effectually; and there is less waste with this Machine than with any marble slab.

As to the quantity ground at once on this mill, it must be regulated by the state of fineness to which it is required to be ground. If it is wanted to be very fine, a smaller quantity must be put on the roller at a time; and as to time requisite for grinding a given quantity of colour, this will also depend on the state of fineness to which it is ground. I have observed that my colour-grinder has ground the quantity of colour which used to serve him per day, with this machine, in three hours, and, as he said, with ease. The colour also was much more to my satisfaction than in the former way, and attended with less waste.

I have mentioned the pulverizing the colours in a covered mortar, which would

would prevent waste, and prevent the dust and finest parts of noxious colours from being injurious to the grinder.—In some manufactories, where large quantities of colours, prepared from lead, copper, and arsenic, are used, this precaution is particularly necessary. I do not mean to say that my machine is intended to supersede the paint-mill now in use for coarse common colours. It is intended for no such purpose; but to supersede the use of the very awkward and unmechanical marble slab now in use, and on which all the colours for china manufactories, coach-painters, japanners, and colour-manufacturers for artists, &c. &c. are now ground.

Several of the colour-manufacturers have expressed to me their great want of such a machine; and that I had no desire of troubling the public with a machine that would not answer, is evident, from my having used it several years

years before I presumed to recommend it to their attention. Being therefore now completely convinced of its utility, and hoping that it might relieve a number of my fellow-creatures from a dangerous employment, I have ventured to commit it to the protection of the Society of Arts; hoping, through their means, to see its ultimate success. And, farther to give the Society the most complete assurance in my power, I have annexed the opinion of a very ingenious and mechanical friend of mine, who has frequently seen it work. If any other questions should occur to the Committee, that may be in my power to explain, I shall gladly do so.

I am, Sir,

Your most obedient servant,

JAMES RAWLINSON.

Derby, Feb. 6, 1804.

CHARLES TAYLOR, Esq.

P. S. When the colour is ground, I recommend the following mode of tying

tying it up in bladders, in preference to the usual method. Instead of drawing the neck of the bladder close, in the act of tying it, insert a slender cylindrical stick, and bind the bladder close around it. This, when dry, will form a tube or pipe, through which, when the stick is withdrawn, the colour may be squeezed as wanted, and the neck again closed by replacing the stick. This is not only a neater and much more cleanly mode than the usual one of perforating the bladder; and stopping the hole with a nail, or more commonly leaving it open, to the prejudice of the colour; but the bladder, being uninjured, may be used repeatedly for fresh quantities of colour.

N.B. The barrel of a quill may be tied, in place of the stick, into the neck of the bladder, with its closed end outwards, which will keep the colour secure in travelling, and when used, the end

end of the quill being cut off, it may afterwards be closed by a stick.

A Certificate from Mr. Thomas Swanwick, of Derby, and also from Mr. John Middleton, of St. Martin's-lane, confirming the above statement, accompanied these papers.

Reference to the improved Mill, for grinding Indigo, or other dry colours.

Plate 6. *Fig.* 4. L, represents a mortar made of marble or hard stone; one made in the common way will answer.

M, A muller or grinder, nearly in the form of a pear, in the upper part of which an iron axis is firmly fixed, which axis, at the parts NN, turns in grooves or slits, cut in two pieces of oak projecting horizontally from a wall, and when the axis is at work, are

are secured in the grooves by iron pins, O O.

P. The handle, which forms a part of the axis, and by which the grinder is worked.

Q. The wall in which the oak pieces, N N, are fixed.

R. A weight, which may occasionally be added, if more power is wanted.

Fig. 5, Shows the muller or grinder, with its axis separate from the other machinery; its bottom should be made to fit the mortar.

S, Is a groove cut through the stone.

On grinding indigo, or such substance, in a dry state, in this mill, the muller being placed in the mortar, and secured in the oak pieces by the pins, the indigo to be ground is thrown above the muller into the mortar; on turning the handle of the axis, the indigo in lumps falls into the groove cut through the muller, and is from thence drawn under

under the action of the muller, and propelled to its outer edge within the mortar, from whence the coarser particles again fall into the groove of the muller, and are again ground under it; which operation is continued, till the whole of it is ground to an impalpable powder; the muller is then easily removed, and the colour taken out.

A wood cover, in two halves, with a hole for the axis, is usually placed upon the mortar, during the operation, to prevent any loss to the colour, or bad effect to the operator.

The

The GOLD MEDAL of the Society was this Session voted to Mr. ROBERT SEPPINGS, of Chatham Yard, for his method of obviating the necessity of lifting ships.

An Engraving of this Invention is hereunto annexed, and of its application for the purpose of fids for masts.

Models and Drawings, explanatory of the manner in which the different operations are effected, are placed in the Society's Repository.

The following COMMUNICATION was received from him.

SIR,

I HAVE to request you will lay before the Society a Drawing and Model, with a Paper, descriptive of a plan, invented by me, for obviating the necessity of lifting ships; the same having been proved and put in practice

tice in his Majesty's dock-yards; should the Society think it deserving their notice.

I am, Sir,
Your most obedient servant,
ROBT. SEPPINGS.

London, Nov. 23, 1803.

CHARLES TAYLOR, Esq.

THE following is a description of an invention, by Mr. Robert Seppings, late master shipwright assistant in his Majesty's yard at Plymouth, (now master shipwright of his Majesty's yard at Chatham), for suspending, instead of lifting, ships, for the purpose of clearing them from their blocks; by which a very great saving will accrue to the public; and also two-thirds of the time formerly used in this operation. From the saving of time another very important advantage will be derived, that of enabling

enabling large ships to be docked, suspended, and undocked, the same spring tides. Without enumerating the inconveniencies arising, and, perhaps, injuries, which ships are liable to sustain, from the former practice of lifting them, and which are removed by the present plan; that which relates to manual labour deserves particular attention; twenty men being sufficient to suspend a first-rate, whereas it would require upwards of 500 to lift her. The situation which Mr. Seppings held in Plymouth yard, attached to him, in a great degree, the shoring and lifting of ships, as well as the other practical part of the profession of a shipwright. Here he had an opportunity of observing, and indeed it was a subject of general regret, how much time, expense, and labour, were required in lifting a ship, particularly ships of the line. This induced him to consider whether some contrivance could not be adopted

to obviate these evils. And it occurred to him, that if he could so construct the blocks on which the ship rests, that the weight of the ship might be applied to assist in the operation, he should accomplish this very desirable end. In September, 1800, the shoring and lifting the San Josef, a large Spanish first-rate, then in dock at Plymouth, was committed to his directions; to perform which, the assistance of the principal part of the artificers of the yard was requisite. In conducting this business, the plan, which will be hereafter described, occurred to his mind; and from that time, he, by various experiments, proved his theory to be correct: the blocks, constructed by him, upon which the ship rests, being so contrived, that the facility in removing them, is proportionate to the quantity of pressure; and this circumstance is always absolutely under command, by increasing or diminishing the angle of three wedges,

wedges, which constitute one of the blocks; two of which are horizontal, and one vertical. By enlarging the angle of the horizontal wedges, the vertical wedge becomes of consequence more acute; and its power is so increased, that it has a greater tendency to displace the horizontal wedges, as can be proved by a model, which accompanies this statement; where the power of the screw is used as a substitute for the pressure of the ship.

Mr. Seppings caused three blocks to be made of hard wood, agreeable to his invention, and the wedges of various angles. The horizontal wedges of the first block were nine degrees; of the second, seven; and of the third, five; of course, the angle of the vertical wedge of the first block was 162 degrees; of the second, 166; and of the third, 170. These blocks, *or* wedges, were well executed, and rubbed over with soft soap for the purpose of expe-

riment. They were then placed in a dock, in his Majesty's yard at Plymouth, in which a sloop of war was to be docked; on examining them after the vessel was in, and the water gone, they were all found to have kept their situations, as placed before the ship rested upon them. Shores in their wake were then erected to sustain the ship, prior to the said blocks being taken from under the keel. The process of clearing them was, by applying the power of battering-rams to the sides of the outer ends of the horizontal wedges; alternate blows being given fore and aft; by which means they immediately receded, and the vertical wedges were disengaged. It was observed, even in this small ship, that the block which was formed of horizontal wedges of nine degrees, came away much easier than those of seven, and the one of seven, than that of five. In removing the aforesaid blocks by the power of the battering-

battering-rams, which were suspended in the hands of the men employed, by their holding ropes passed through holes for that purpose, it was remarked by Mr. Seppings, that the operation was very laborious to the people; they having to support the weight of the battering-rams, as well as to set them in motion. He then conceived an idea of affixing wheels near the extremity of that part of the rams, which strikes the wedges. This was done before the blocks were again placed; and it has since been found fully to answer the purpose intended, particularly in returning the horizontal wedges to their original situations, when the work is performed for which they were displaced; the wheels also giving a great increase of power to the rams, and decrease of labour to the artificers; besides which, the blows are given with much more exactness. The same blocks were again laid in another dock, in which a two-decked ship of the line was docked.

On examination, they were found to be very severely pressed, but were removed with great ease. They were again placed in another dock, in which a three-decked ship of the line was docked. This ship having in her foremast and bowsprit, the blocks were put quite forward, that being the part which presses them with the greatest force. As soon as the water was out of the dock, it was observed, that the horizontal wedges of nine and seven degrees had receded some feet from their original situations. This afforded Mr. Seppings a satisfactory proof, which experience has since demonstrated, (though many persons before would not admit of, and others could not understand, the principle) that the facility of removing the blocks or wedges, was proportionate to the quantity of pressure upon them. The block of five degrees kept its place, but was immediately cleared, by applying the power of

of the battering-rams to the sides of the outer ends of the horizontal wedges. The above experiments being communicated to the Navy Board, Mr. Seppings was directed to attend them, and explain the principle of his invention; which explanation, farther corroborated by the testimonials of his then superior officers, was so satisfactory, that a dock was ordered to be fitted at Plymouth under his immediate directions. The horizontal wedges in this, and in the other docks, that were afterwards fitted by him, are of cast iron, with an angle of about five degrees and a half, which, from repeated trials, are found equal to any pressure, having in no instance receded, and, when required, were easily removed. The vertical wedge is of wood, lined with a plate of wrought iron, half an inch thick. On the bottom of the dock, in the wake of each block, is a plate of iron three quarters

of an inch thick, so that iron at all times acts in contact with iron.

The placing the sustaining shores, the form and sizes of the wedges, and battering-rams, &c. also the process of taking away, and again re-placing, the wedges of which the block is composed, are also exemplified by a model.

The dock being prepared at Plymouth, in August, 1801, the Canopus, a large French 80-gun ship, was taken in, and rested upon the blocks; and the complete success of the experiment was such, that other docks were ordered to be fitted at Sheerness and Portsmouth Dock-yards, under Mr. Seppings's directions. At the former place a frigate, and at the latter a three-decked ship, were suspended in like manner. This happened in December, 1802, and January, 1803; and the reports were so favourable, as to cause directions to be given

given for the general adoption of these blocks in his Majesty's yards. This invention being thought of national consequence, with respect to ships, but particularly those of the navy, Government has been pleased to notice and reward Mr. Seppings for it.

The time required to disengage each block, is from one to three minutes after the shores are placed: and a first-rate sits on about fifty blocks. Various are the causes for which a ship may be required to be cleared from her blocks, viz. to shift the main keel; to add additional false keel; to repair defects; to caulk the garboard seams, scarples of the keel, &c. Imperfections in the false keel, which are so very injurious to the cables, can in the largest ship be remedied in a few hours by this invention, without adding an additional shore, by taking away blocks forward, amidships, and abaft, at the same time; and when the keel is repaired in the wake

wake of those blocks, by returning them into their places, and then by taking out the next, and so on in succession. The blocks can be replaced in their original situations, by the application of the wheel battering-rams to the wedges, the power of which is so very great, that the weight of the ship can be taken from the shores that were placed to sustain her. There were one hundred and six ships of different classes, lifted at Plymouth dock-yard, from the 1st of January, 1798, to the 31st of December, 1800; and, had the operation of lifting taken less time, the number would have been very considerably increased; for the saving of a day is very frequently the cause of saving the spring tide, which makes the difference of a fortnight. The importance of this expedition, in time of war, cannot be sufficiently estimated.

This invention may be applied with great advantage, whenever it is neces-

sary

sary to erect shores, to support any great weights, as, for instance, to prop up a building during the repair of its foundation, &c. Captain Wells, of his Majesty's ship Glory, of 98 guns, used wedges of Mr. Seppings's invention for a fid of a top-gallant mast of that ship. In 1803, the top-gallant masts of the Defence, of 74 guns, were fitted on this principle by Mr. Seppings; and, from repeated trials, since she has been cruizing in the North Sea, the wedge fids have been found in every respect to answer.

But it is Mr. Seppings's wish that it should be understood, that the idea of applying his invention to the fid of a top-gallant mast originated with Capt. Wells, who well understood the principle, and had received from him a model of the invention.

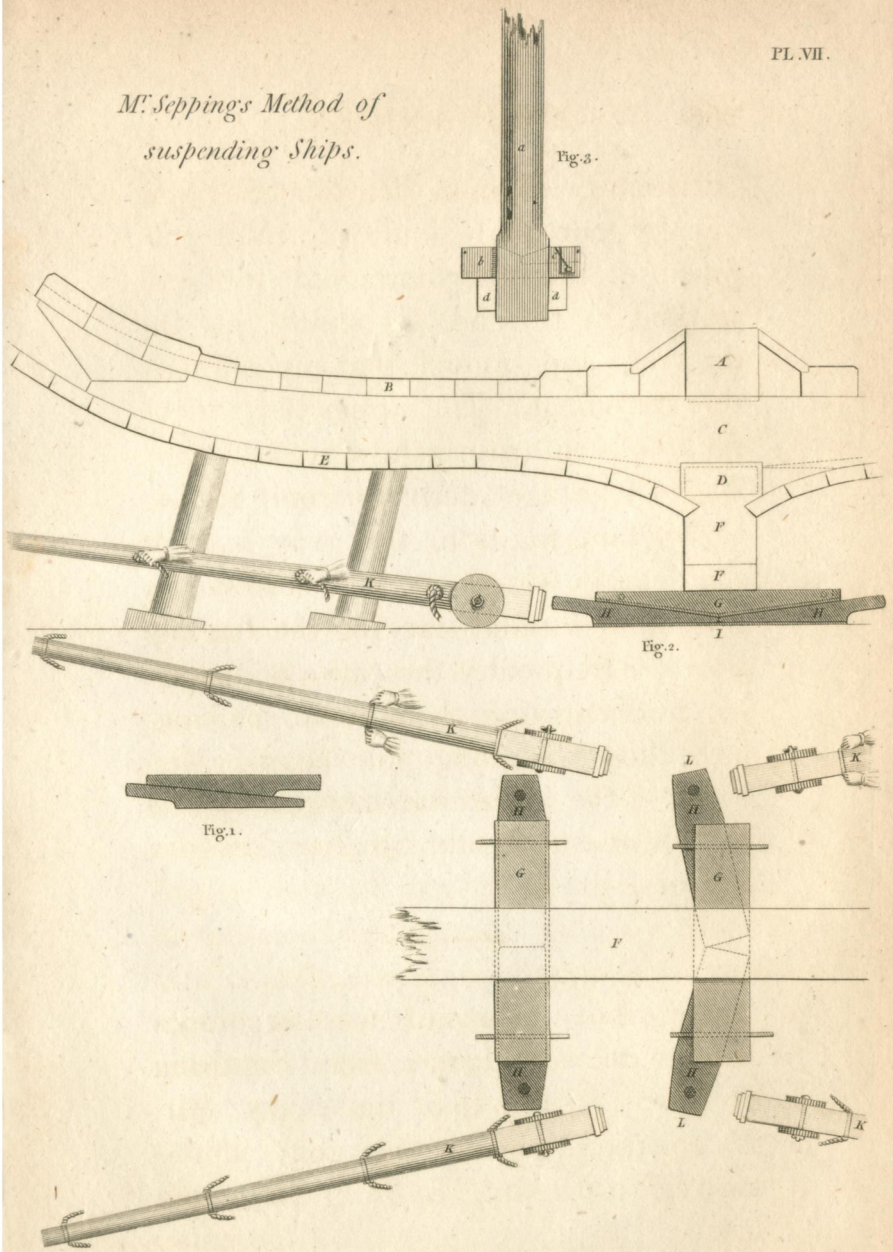
When it is required to strike a top-gallant mast, the top ropes are hove tight, and the pin which keeps the horizontal

horizontal wedges in their place, is taken out, by one man going aloft for that purpose; the other horizontal wedge is worked in the fid, as shown in the drawing and model that accompany this statement. The upper part of the fid hole is cut to form the vertical wedge. The advantage derived from fidding top-gallant masts in this way is, that they can be struck at the shortest notice, and without slacking the rigging, which is frequently the cause of springing and carrying them away, particularly those with long pole heads. The angle of the horizontal wedges for the fids of masts should be about twenty degrees.

The above Account was accompanied with Certificates from Sir John Henslow, Surveyor of the Navy; Mr. M. Didram, master-shipwright of Portsmouth-Yard; and Mr. John Carpenter, Foreman

PL. VII.

Mr. Seppings's Method of suspending Ships.



C. Varley delin.

Foreman of Sheerness Dock-yard, confirming Mr. Seppings's statement.

Reference to the Engraving of Mr. SEPPINGS's *method of obviating the necessity of lifting Ships. Plate VII.*

This plan and section of a seventy-four gun ship describes the method of obviating the necessity of lifting ships, when there may be occasion to put additional false keels to them, or to make good the imperfections of those already on; also when it may be necessary to caulk the garboard seams, scarples of the keel, &c. by which means a very considerable part of the expense will be saved, and much time gained. The blocks are cleared, and again returned by the following process. A sufficient number of shores are placed under the ship to sustain her weight, and set taught, stationed as near the keel as the working of the battering-rams fore and

and aft will admit. Avoid placing any opposite the blocks, as they would in that case hinder the return of the wedges with the battering-rams. A blow must then be given forward on the outer end of the iron wedges with the battering-rams in a fore and aft direction, which will cause them to slide aft, as shown in the plan. The battering-rams abaft then return the blow, and the wedges again come forward; by the repetition of this operation, the wedges will be with great ease cleared, and the angular block on the top will drop down. When the work is performed, the block must be replaced under the keel, and the wedges driven back by working the rams athwart-ships, as described in the section.

N.B. In returning the iron wedges, to avoid straining the angular blocks, it is proposed to leave a few of them out forward and aft, and stop the ship up,

up, by laying one iron wedge on the other, as shown at *Fig.* 1, *Plate VII.*

To facilitate the business, blocks may be cleared forward and aft at the same time, sufficient to get in place one length of false keel. If the false keel should want repairing, it may be done without any additional shores, by clearing one block at a time, and when the keel is repaired in the wake of that block, return the wedges, as above directed, and clear the next, &c.

Section and Plan, Plate VII. Fig. 2.

A. Keelson.
B. Ceiling.
C. Floor timber.
D. Dead or rising wood.
E. Plank of the bottom.
F. Keel and false keel.
G. Angular blocks with a half-inch iron-plate bolted to them.

H. Cast

H. Cast-iron wedges.

I. Iron plate of three-fourths of an inch thick on the bottom of the dock.

K. Battering-rams, with wheels, and ropes for the hands.

L. Cast-iron wedges, having received a blow from forward.

M. Shores under the ship to sustain her weight.

Fig. 3, represents part of a top-gallant mast fitted with a wedge fid.

a. Top-gallant mast.

b. Fid, with one horizontal wedge worked on it.

c. Moveable wedge, with the iron strap and pin over it, to keep it in its situation.

d. Trussel trees.

The

The SILVER MEDAL of the Society, and TEN GUINEAS, were this Session voted to Mr. GEORGE DODD, of Duke-street, Portland-place, for an improved GUN-LOCK.

An ENGRAVING of this Invention is hereunto annexed; and a MODEL thereof is placed in the Society's Repository for public inspection.

The following COMMUNICATION was received from him.

SIR,

PERMIT me to request you to lay before the Society of Arts, the accompanying *Improved Gun-Lock*, as I am anxious to unite the opinion of so respectable a Society to the high military approbation it has been honoured with; that improvements so very useful to our country, may have that publicity which they deserve.

The invention is original, and the principles are new, and totally dissimilar to any others ever made public. In these improvements, I am persuaded, you will observe with pleasure a happy union of *strength*, *simplicity*, and *cheapness*, blending at the same time a variety of other most important improvements, well calculated to prevent injurious accidents to our friends, and to be more effectual against our foes.

I would just farther observe, that I have caused these locks to be fitted to muskets, and practised by some Volunteer Corps, where the result fully equalled my wishes. Immediately after I had perfected these improvements, I communicated them to the proper military officers, that no time might be lost at this critical juncture of national affairs, in rendering them of service to the country. They were therefore inspected and approved of by his Royal Highness the Commander in Chief, who has

has publicly declared his opinion of their superior utility. They have also been inspected by Generals Drummond, Lloyd, Fead, Blomefield, and others, at Woolwich, who in their reports to the Honourable Board of Ordnance, entirely approve of the improved Locks, some of which are now manufacturing by order of the Honourable Board. I wish, therefore, without delay, to render them public, as they are equally applicable to civil as well as military purposes. Any improvements in fire-arms are truly essential to the country, not only from its present military posture, but the great quantity daily manufactured; Government alone having annually had 150,000 small arms, on a mean of the last ten years, as I am informed by his Majesty's principal Armoury Officer at the Tower.

Nothing farther appears necessary to render these useful improvements public, than to unite to this military ap-

probation, the opinion of the Society of Arts; and I trust that these improvements will appear to merit their approbation, when they have been duly considered, and will find a place in their excellent Repository.

I am, Sir,
Your most obedient servant,
G. DODD.

London, Jan. 30, 1804.

CHAS. TAYLOR, Esq.

Description of Mr. DODD's *improved Gun-Lock.*

This Lock is so perfectly secure at half-cock, as to preclude the possibility of its firing in that state, by *accident*, *violence*, or *design*. It possesses all the *advantages* of stop, or *bolt-locks*, without their inconveniences or complicated construction. Nor has it one piece of machinery more than there is at present in the simplest of common locks.

Though

Though these improved locks are perfectly secure at half-cock, they will fire from whole-cock, with much more certainty than a lock having a hair-trigger, because less complex, and with equal fleetness.

A most valuable improvement in this lock is, that *pulling the trigger*, when the piece is at *half-cock*, renders it *more and more secure*, the reverse of this being the case with common locks; for the more powerfully the trigger is pulled when they are at half-cock, the more insecure they become.

Another truly essential improvement is, that this lock *cannot possibly* catch and *stop*, at the position of *half-cock*, when *passing from the whole cock*, and *miss fire*; a serious misfortune, to which locks made on the common principle are so liable, that to prevent it, all the best of these use a peculiar piece of machinery called a fly, or *détachant*.

The improved locks will be much *less liable* to be *out of repair*, as the bents are much deeper, and run through the solid metal direct towards the centre of the tumbler; unlike the usual bents, that are *small*, *pointed*, and the line of their depth *near the circumference* of the tumbler. Hence they are apt to be snapped off, or easily worn away, and fire from half-cock, as too frequently and fatally occurs.

When these improved locks require cleaning, they are of so plain and simple a construction, as easily to be taken to pieces, and put together by any soldier or sportsman.

To put one of these improved locks to an *old stock*, it is merely necessary to make some *trivial alterations* in the excavation of the wood.

The sportsman who has one of these improved locks to a fowling-piece, if the trigger should become entangled with

Mr. Dodd's Gun Lock.

Fig. 1.

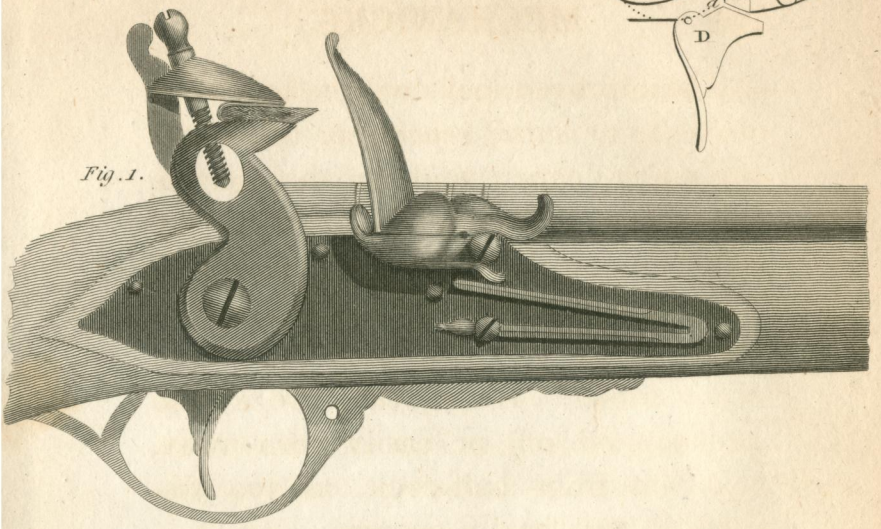


Fig. 3.

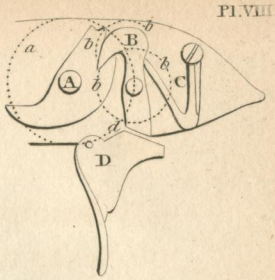


Fig. 4.

Fig. 2.

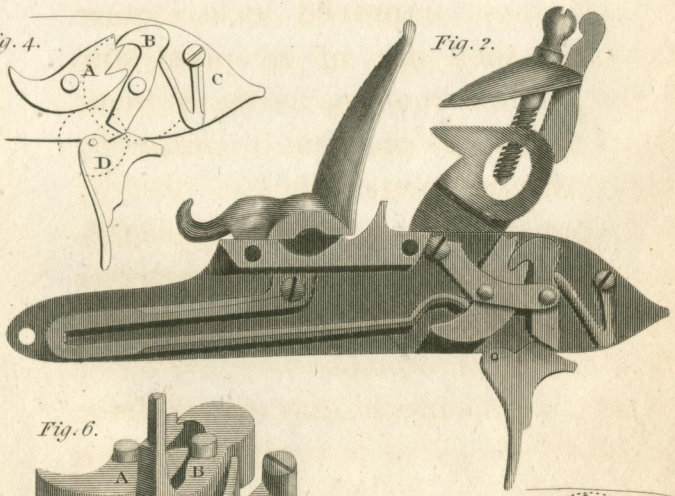


Fig. 6.

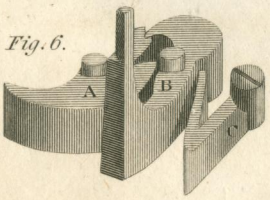
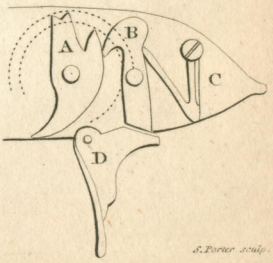


Fig. 5.



Geo. Dodd delt.

S. Porter sculp.

with a twig, may forcibly *pull his piece away*, assured, that in so doing, he increases his safety; but, if it be a common lock, he must turn back, and cautiously unloose, lest the piece explode.

The improved locks possess four times the strength of common locks where the latter are weakest, and are of equal strength in all other parts.

Among the many contrivances and complicated means to prevent pieces going off at half-cock, *bolts* have principally been used; but they are ill adapted to the purpose, exclusive of the additional expense; for few people, when *alarmed*, have the *presence of mind* first to unbolt the piece to render it fit for service, but they instantly attempt to cock. Disappointment adds to their agitation, and increases the confusion; and, ere they recollect their mistake, the lost moments, at such a juncture, may occasion the loss of their lives; especi-

ally from free-booters and riflemen, who are always prepared before they attack, and seldom show mercy to them from whom it appeared they had none to expect. But this lock is admirably devised for *safety and service*, as it merely need be *cocked* for *use*, and *half-cocked* for *security*; both which can be performed with expedition equal to that of any other lock that ever was made public.

Common locks are subject to the most momentous failing of a *false* or *delusive half-cock*; for the nose of the sear rests on the point of the half-cock bent, which, as it causes no *alteration* in the external *appearance*, cannot be discovered, and its sad effects prevented. This very serious accident frequently occurs among recruits and unskilful gunners, from inattention to a very fine punctilio of military exercise; but it is utterly impossible that this should ever occur with the improved Lock, by *accident*

cident or *even by design*. The improved lock is constructed on more mechanical principles, and is much simpler, and more easy to manufacture, than any other lock. Hence, there will be *no increase of expense* in execution, but a considerable decrease to the locks of *rifles*, *fowling-pieces*, *pistols*, &c.

Simplicity alone is deemed a valuable improvement; but, to this excellency, the improved lock unites a pleasing variety of *new* and *useful* superiorities, *without sacrificing any advantage* which the best of common locks at present possess.

These improvements are equally applicable to all descriptions of fire-arms, civil as well as military.

Certificates of the utility and novelty of Mr. Dodd's Gun-Locks were received from the following gun-makers; viz.—Mr. Philip Bond, of Cornhill; Mr. W. Clark, of Holborn; and Messrs. Tatham and Egg, Admiralty. Two letters from the

the Board of Ordnance to Mr. Dodd, approving of his invention, were also submitted to the Society.

Explanation of the Engraving of Mr. DODD'S *improved Gun-Lock, Plate VIII.*

Fig. 1. Represents the exterior of the improved Gun-Lock.

Fig. 2. The interior of the same.

Fig. 3. Shows, A, the tumbler; B, the sear; C, the sear spring; D, the trigger: all at the position of half-cock.

Fig. 4. Represents the same parts at whole-cock.

Fig. 5. Bearer, or the position of A, B, C, and D, immediately after the lock is fired, and the finger withdrawn from the trigger.

The particulars to be attended to in constructing this Lock are, that the centre of the sear B, should be *placed in the circle, a, Fig.* 3. (the radius of this circle

circle lies between the *centre* of the tumbler and the extreme *point of whole-cock bent)*; and that *the under side of the nose of the sear* and the *under side of half-cock bent*, and the *under side of whole-cock bent*, must be *segments of the circle b*, whose radius extends from the under side of the nose of the sear to the centre of the sears; by this means the sear will fit both the the bents *perfectly close*, and hold quite firm together without *any tendency to alter their positions;* neither will they need any *assistance* from the sear spring *to keep them* in their station.

It is also necessary that the back of the sear be somewhat hollowed, to prevent the sear spring pressing too hard at whole-cock. These are the mechanical points to be attended to in making one of the improved Gun-Locks; all other particulars workmen will soon discover by inspecting the plate.

A Bounty

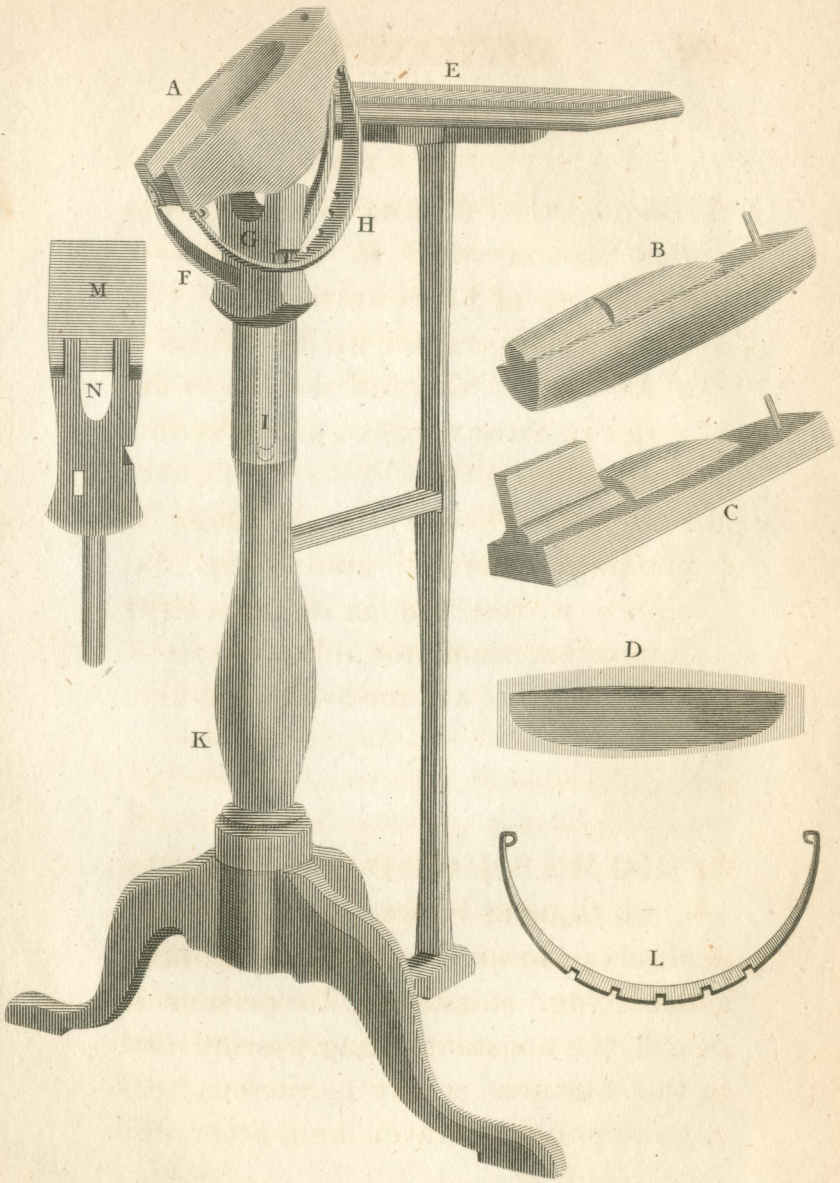
A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. THOMAS HOLDEN, of Fettleworth, near Petworth, in Sussex, for his Invention of a MACHINE to do all the THREAD-WORK in SHOEMAKING in a standing Posture.

An ENGRAVING of the Machine is hereunto annexed; one of the Machines is reserved in the Society's Repository; and the following COMMUNICATION was received from him.

SIR,

THOMAS HOLDEN, of Fettleworth, near Petworth, has invented a Machine to do all the thread-work in shoemaking, standing. To persons in health, the constant sitting posture used in this business is very pernicious; occasioning piles, gravel, and other disorders.

Mr. Holden's Machine for Shoe-makers. PL. IX.



C. Varley del.

orders. This machine will obviate these evils; the expense of it will not be more than from twenty to thirty shillings, which being within the means of every journeyman to obtain, renders the object very desirable. I beg leave to recommend it to the Society's attention, and am, Sir,

Your very humble servant,

NICHOLAS TURNER.

Lurgasale, near Petworth,
Sept. 28, 1802.

Mr. CHAS. TAYLOR.

SIR,

FROM the sitting posture used in my employment, as a shoemaker, I suffered so much in my health, and from the piles, that I thought I must either give up my business, or lose my life. In this difficulty I invented this Machine, got it made, and went to work with it. I found it answer to my satisfaction, and its use followed by a

restoration

restoration of my health. I believe I have made eighteen hundred or two thousand pair of shoes with it, and still work on. I recommend it as the quickest way of closing all the thread-work.

My Machine is fixed to the floor, a little to the left of the seat, but within reach of the hand; the work is held on with a stirrup, and suits to the place. You will see from a trial, that it will perform the work to my credit.

I am, Sir,
Your humble servant,
THOMAS HOLDEN.

Fettleworth, Jan. 24, 1803.

CHAS. TAYLOR, Esq.

CERTIFICATES from John Summersell, cordwainer, and overseer of the parish; Richard Hawkins, John Tilly, George Hawkins, Thomas Tilly, and Edward Hawkins, cordwainers, confirmed the above statement.

SIR,

SIR,

I AM sincerely of opinion, that Thomas Holden's invention is a desirable acquisition to men of that profession, especially to those who may be diseased internally, or who may suffer from stomach weakness and indigestion. These diseases may be aggravated, if not occasioned, by their working in a bent posture.

The inventor, about twenty years ago, often applied to me for relief from a train of bowel complaints, and frequently had occasion to take the medicines usually employed for the relief of dyspepsia.

I repeatedly informed him, that his employment was the cause of his disorder, and desired him to relinquish it, or invent some method to do his work standing. This hint, and his corporeal sufferings, prompted him to the invention. That it answers the purpose, I have

have reason to believe, as he and others use it. He is now free of complaints, and so improved in his corpulence and countenance, that he is not like the same man, and for years has had no occasion for medicine.

I am, Sir,
Your obedient servant,
PETER MARTIN, Surgeon.

Tulborough, Suffex, May 9, 1803.

Mr. CHARLES TAYLOR.

Reference to the Engraving of Mr. HOLDEN's *Invention for Shoemakers, Pl. IX.*

A. The bed for the closing block, and to lay the shoe in, whilst sewing.
B. The closing block.
C. A loose bed to lay the shoe in whilst stitching; the lower part of which is here exhibited reversed, to show how it is placed in the other bed, A.

D. The

D. The hollow or upper part of the loose bed C, in which the shoe is laid whilst stitching.

E. A table on which the tools wanted are to be laid.

F. An iron semicircle, fixed to each end of the bed A, to allow the bed to be raised or depressed. This half circle moves in the block G.

H. Another iron semicircle, with notches, which catch upon a tooth in the centre of the block, to hold the bed in any angle required. This semicircle moves sideway on two hooks in staples, at each end of the bed.

I. The tail or stem of the bed A, moving in a cylindrical hole in the pillar, enabling the bed to be turned in any required direction, and which, with the movement F, enables the operator to place the shoe in any position necessary.

K. The pillar, formed like the pillar of a claw table, excepting the two side legs being in a direct line, and the other leg at a right-angle with them.

L. The semicircle H, shown separately, to explain how it is connected with the staples, and how the notches are formed.

M. The tail or stem of the bed A, and the lower part of the bed N, shown separately, to explain how the upper part of the bed is raised or depressed occasionally.

A BOUNTY of THIRTY GUINEAS was this Session voted to Mr. WILLIAM HARDY, No. 61, Chapel-street, near White-Conduit-House, for his method of BANKING the BALANCE of a TIME-KEEPER.

The following COMMUNICATION was received from him, and a MODEL of this Invention, reserved in the Society's Repository for public inspection.

SIR,

THIS letter is accompanied with a Drawing, a Description, and a Model, of a more perfect mode of banking the Balance of a Time-Keeper, than any that has yet appeared; and its application to a time-keeper is a matter of such real importance, that the most accurate, without this most necessary appendage, is liable to such derange-

ment, that from the most trivial cause, it is in one moment rendered useless.

To preserve the good qualities of the time-keeper, on which often the strength, the wealth, the grandeur, and safety of this great empire depend, I deem it necessary that my invention should be laid before the Society of Arts, as the means of its being more generally known; and I hope that I show proper respect to the Society, when I assure you that I do not offer any crude idea, neither could I think of giving you any trouble, until I had fully verified the utility of my contrivance by several years trial. As I can produce the testimony of some of the most eminent watchmakers in favour of my invention, I look forward with some degree of confidence, in expectation of obtaining the approbation of the Society.

It was at first imagined, that a banking to a watch with a free escapement was quite unnecessary, as the limits of bank-

ing

ing were so great as to admit of almost twice 360, or 720 degrees; but, on trial, the balance was frequently found to exceed this quantity, and that a very slight motion given to the time-keeper (particularly when the axis of the balance became the axis of that motion), was sufficient to alter the strength and figure of the pendulum-spring, and position of the pieces in respect of the balance-wheel, so as to change the rate of the time-keeper; and, what was worse, require a new adjustment of the balance, to accommodate itself to the changes made in the spring, and other parts connected with it. Hence it became necessary, that some means should be used to stop the balance at certain limits beyond its natural arch of vibration; and various attempts have been made to effect it. One way is, by a moveable piece on the axis of the balance, which banks against a pin, yet so as to suffer the balance to vibrate more

than 360 degrees. Another method is to have a piece moveable on a centre in one of the arms of the balance, and applying itself as a tangent to the pendulum-spring, which passes through a hole in the piece. It has also a knee, which almost touches the plate, and just passes free of a pin placed in it. But when the balance vibrates so as to approach its utmost limits, the action of the spring, while in a state of unwinding, throws the piece outward, so as to fall in the way of the pin, and stop the balance from proceeding farther. Another mode is by a straight spring, screwed upon the plate, having a hook at the end of it, into which a pin placed in the balance strikes, when, as before, the pendulum-spring, in unwinding, touches the straight spring, and moves it a little outwards. There is also a way of banking by means of a bolt, which is thrown back by the pendulum-spring, and made to fall in the way of a pin placed

placed in the rim of the balance. These are the principal modes of banking now in use, and they do not differ materially from one another in principle. But the weight and friction of so many pieces, on so delicate an organ as that of a pendulum spring, are perhaps nearly as hurtful to the time-keeper as the injury it may sustain when it is left without any banking whatever.

I am, Sir,
Your most obedient servant,
WILLIAM HARDY.

No. 61, Chapel-street, near White-Conduit-House,
Jan. 18, 1804.

CHARLES TAYLOR, Esq.

DESCRIPTION *of a new and most accurate* MODE *of* BANKING *the* BALANCE *of a* TIME-KEEPER, *Plate X. Fig. 1 and 2.*

In *Figures* 1 and 2 the same letters are placed, to signify the same things. A A is the balance to which the pendulum-spring is fastened in the usual way. In one of the crosses of the balance is placed a pin P, which stands a little way above its surface; and when the balance is caused to vibrate a complete circle, the pin in its motion will describe the dotted circle P O Q, and just pass clear of the inside of a projection formed on a cock B, which is fastened on the plate by means of a screw. At about one-fourth of a turn of the pendulum-spring, reckoned from its stud E, is placed a very delicate tapering piece of steel S, having a small hole in it, through which the pendulum-spring passes; and it is fastened to it by means of

of a pin, and stands perpendicular to the curve of the spring. Let the balance be at rest, as represented in *Fig.* 1, the banking-pin at P, and the banking-piece at *s*. Suppose the balance is made to vibrate from P towards O, when P arrives at the banking-piece *s*, it will pass it without touching, because its extremity *s* lies wholly within the circle traced out by the banking-pin. But when the banking-pin P has arrived at Q, the banking-piece *s* will have advanced to *t*, by the pendulum-spring winding itself up into the figure represented by the dotted curve; and when the banking-pin P (now at Q) returns back to P, and passes on from P towards Q, to approach B, and so complete the other half-arch of its vibration, before P can arrive at the banking-cock B, the pendulum-spring will have unwound itself into the figure described by the dotted curve, and the banking-piece *s* will have advanced into the position

position at *r*. just touching the banking-cock. Its extremity *r*, however, being thrown beyond the dotted circle, must necessarily fall in the way of the banking-pin, which arrives there almost at the same moment, and is opposed by it, without the slightest shock to the pendulum-spring. The model renders any farther explanation unnecessary.

WILLIAM HARDY.

No. 61, Chapel-street, near White-Conduit-House,
Jan. 18, 1804.

A BOUNTY

Pl. X.

Mr. Hardy's Method of banking the balance of a Timekeeper.

Fig. 1.

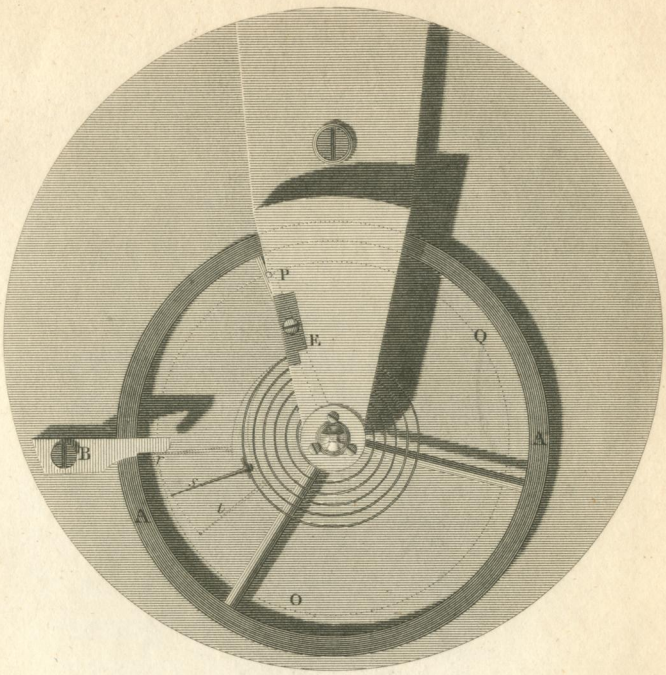
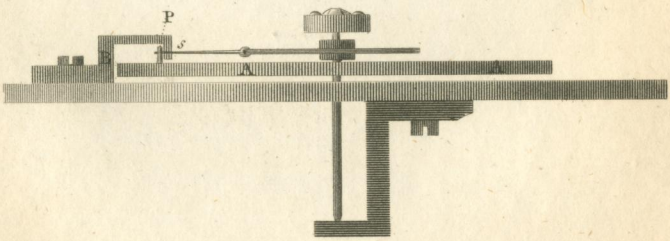


Fig. 2.



Lowry sculp.

A BOUNTY of THIRTY GUINEAS was this Session voted to Mr. J. M. ELLIOTT, No. 19, Aylesbury-street, Clerkenwell, for his improved REPEATING-WATCH.

A MODEL of his invention is placed in the Society's Repository, for inspection, with DRAWINGS and DESCRIPTIONS thereof.

The following COMMUNICATION was received from him, and an EXPLANATORY ENGRAVING is hereunto annexed.

SIR,

ON Wednesday next I purpose, by permission, to lay before the Society for the Encouragement of Arts, &c. a Repeating Watch on a new and very simple principle, without pinions, pullies, chain, or racks. It will repeat the hour and the quarter, the hour without the quarter, or the quarter without

without the hour; the hour first, and the quarter afterwards, or the quarter first, and the hour afterwards, or the hour and the quarter without intermission, with one hammer only. The above-mentioned Watch has met the approbation of mechanical and scientific gentlemen; several having been made for the Turkey, Irish, and American trade, as likewise for home consumption. The Watch will be at the same time accompanied with a Drawing and Description of the same.

I remain,

Your most obedient servant,

J. M. Elliot.

Feb. 4, 1804.

Charles Taylor, Esq.

SIR,

SIR,

HAVING for some years had in contemplation repeating watches, and considering the great expense in the first purchase, and the continual expense of repairs, I was induced to turn my thoughts to the subject, in order, if possible, to reduce them to a much simpler principle, and prices considerably lower; and from models that I have frequently made, and experiments upon them, I flatter myself that I have made several useful improvements thereon. It is well known, that repeating watches have always been, and are at this time, in the hands of few, and in such hands they appear to me more for show and ornament than of any real use; but the middling class of mankind, to whom they are of the most service, are deprived of their benefits. From motives

motives of this kind, the model, the result of my labour, and one upon my last improved plan, are sent for the inspection of the Society of Arts, and for the good of the public.

The method of using the new repeater is as follows:—Hold the watch in the left hand, and apply the finger and thumb to the pendant; and if it is required to repeat the hour, turn it to the right, till it gives a full stop. But if it is to repeat the quarter, turn the pendant to the left, till it gives a full stop, as in winding up a common watch.

In the last place, I shall give a comparative view of the superiority of these new repeaters to the old ones, for the interval of twenty years.

The expense of the old repeater, in the purchase	£30	0	0
Cleaning at half-a-guinea per year, for twenty years	10	10	0
Total amount	£40	10	0

The

The expense of the new repeater in the purchase - - - -	£8	8	0
Cleaning at 5s. per year, for twenty years -	5	0	0
Total amount -	£13	8	0
Which makes a saving to the purchaser of	£27	2	0

Perhaps it may be observed by some mechanical gentlemen, that the model under consideration is not finished in so superb a manner as might have been expected; but in order to obviate every difficulty that may arise, I shall only say, that it is not exhibited as a fine piece of workmanship, but as a piece of mechanism; and, as such, I have taken the liberty of laying it before the Society for the Encouragement of Arts, &c. trusting that they will allow it as much merit as it deserves.

J. M. ELLIOT.

Feb. 20, 1804.

CHARLES TAYLOR, Esq.

SIR,

SIR,

I HAVE herewith sent you a Drawing of the last Improvement of my Repeating Watch, which you will find upon a much simpler principle than the Model left; as I have entirely got rid of the system of parts contained between the plates. I need not expatiate on its utility, that being fully explained in the Drawing annexed. My repeating movements can be added to an old watch for the sum of three guineas, if it is to be a dumb repeater. With a further addition of three guineas, I can furnish my repeating work with a bell and new metal cases.

I remain, Sir,
Your obedient servant,
J. M. ELLIOT.

March 25, 1804.

CHAS. TAYLOR, Esq.

REFERENCE

REFERENCE *to the* ENGRAVING *of Mr.* ELLIOT'S REPEATING WATCH.—*Plate XI. Fig.* 1 *and* 2.

Fig. 1.—Let A B represent the pillar plate, viz. its upper side. C D, a circle of steel, moving freely in the steel pullies E F G H. This steel wheel is put in motion by means of a small wheel *a*, fast on the axis, which goes through the pendent, which acts in the teeth on the under side of the circle represented by the dotted arch *b*. I is the the quarter-snail. K the minute-wheel. The hour-wheel may easily be supposed, therefore requires no description. L is part of the hour-snail, which is not drawn complete, by reason that it would intercept the view of the rack of the steel circle at Q. O is the locking lever. P the end which falls upon the hour-snail, to regulate the number of strokes it is to strike; at the same time, the end Q of the lever O

locks into one or other of the notches in the steel circle. The star-wheel, No. 1, is rivetted or screwed to the hour-snail, and moved by the small arm, No. 2, on the canon-pinion. M and N are the jumper and spring. R is the quarter locking lever. S the end that falls upon the quarter-snail. T the locking end, which locks into the notches at *h*. At *x* is a pin in the steel circle, to which is hooked a chain, and the other end to the barrel V. This chain, when the pendent is put in motion, will unwind from the barrel, and, by acting between the steel rollers U W, will work both to the right and left. *i*, *k*, are small pallets, on which are the tails of the hammers, acted upon by the pins as per figure, so that at the end of the strokes that have struck, the spring in V will draw back the steel circle, and the pins will pass by the hammer-tail, and a small spring under *l* will bring it into its proper place.

EXAM PLE.

Mr. I. M. Elliot's Repeating Watch.

Fig. 1.

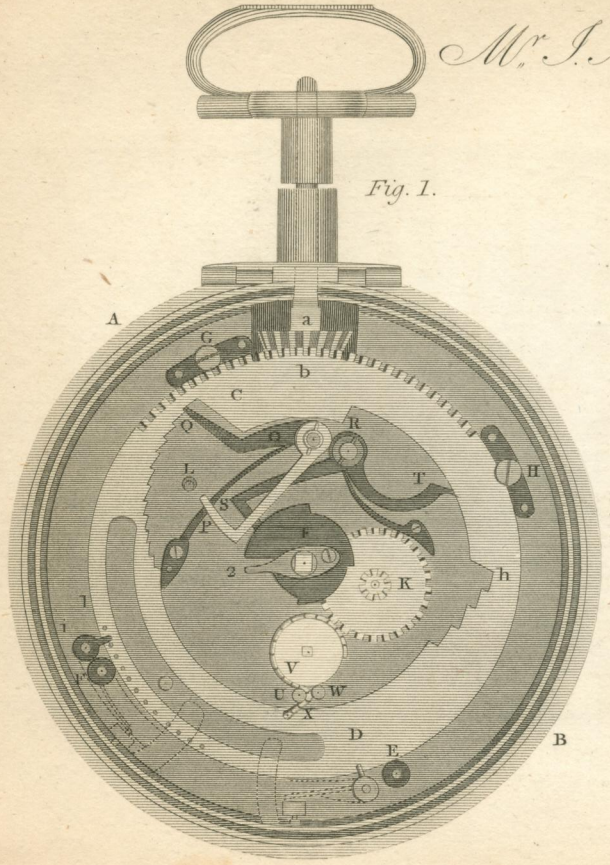
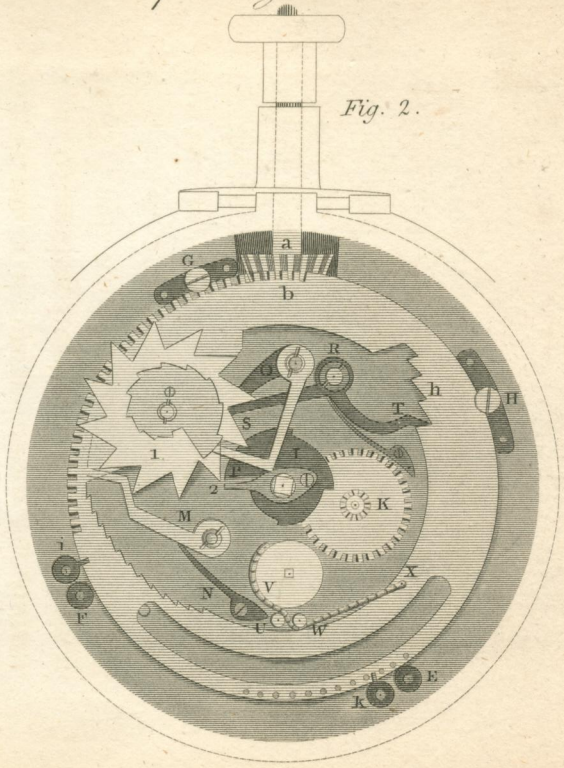


Fig. 2.



EXAMPLE.

I hold the watch in my left hand, and with the right I turn the pendent to the left, to strike the hour. The point P will fall on some part of the hour-snail; at the same time the point Q will stop the steel circle. The hammer of course will give the hour. The same is to be understood of the quarters; only observe to turn to the right.

Fig. 2 explains, by similar letters, in another view, the same parts of the watch, in order that its construction may be more easily comprehended.

Fig 1

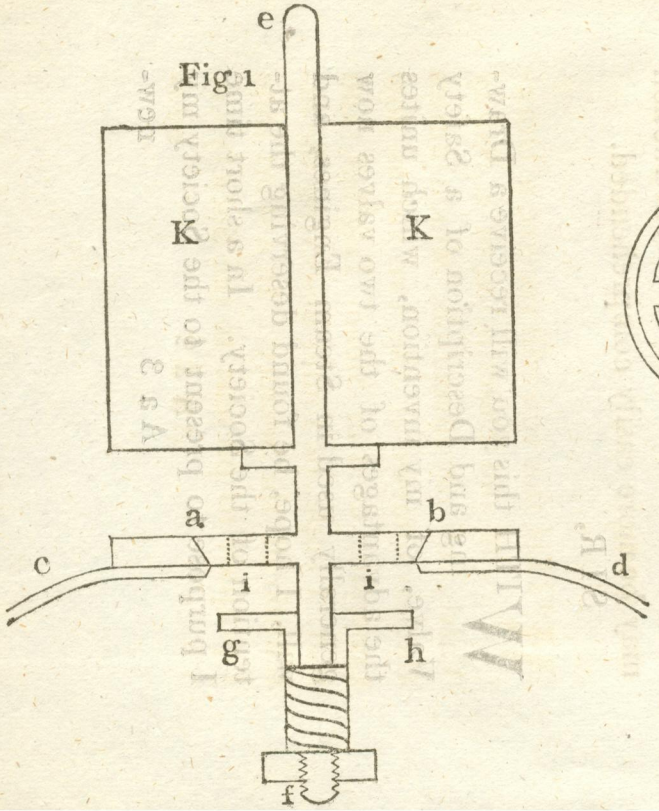


Fig 2

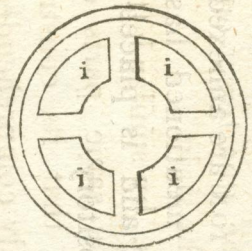
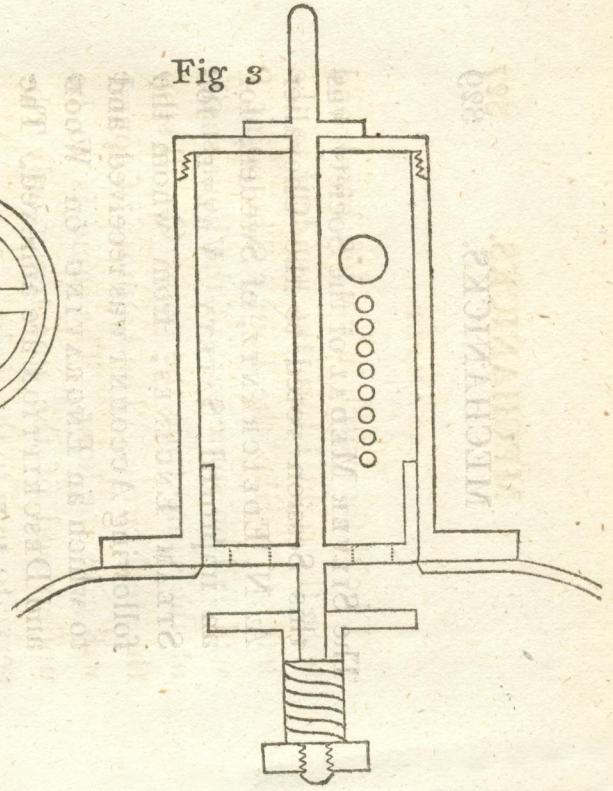


Fig 3



The SILVER MEDAL of the Society was this Session voted to the Chevalier A. N. EDELCRANTZ, of Sweden, for an improved SAFETY VALVE for STEAM ENGINES; from whom the following ACCOUNT was received, and to which an ENGRAVING on WOOD and DESCRIPTION are annexed. The statical Lamp mentioned has since been received, and is placed in the Society's Repository.

SIR,

WITH this you will receive a Drawing and Description of a Safety Valve, of my invention, which unites the advantages of the two valves now generally used in Steam Engines, and will, I hope, be found deserving the attention of the Society. In a short time I purpose to present to the Society my

new-invented statical Lamp, which I shall request them to accept, and am,

SIR,

Your obedient Servant,

A. N. EDELCRANTZ.

London, Feb. 12, 1804.

CHAS. TAYLOR, Esq.

DESCRIPTION *of a* SAFETY VALVE, *containing a Vacuum Valve in the same Hole of the Boiler.*

In large boilers or coppers, where boiling fluids are enclosed, a *safety valve* is generally used to prevent their bursting, from an unexpected excessive force of the elastic steam, and, besides, a *vacuum valve*, to prevent their being compressed or crushed by the weight of external air, in the case of a sudden condensation of the vapours. These two valves are commonly fitted in two different holes in the boiler; but as a more

more simple, and consequently more eligible, method seems to be that of joining them together, I take the liberty to submit to the Society for the Encouragement of Arts, &c. the following contrivance for that purpose:—

a b, *Plate XII. Fig.* 1, is a common conical safety valve, fixed in the boiler *c d*, having four openings, *i i*, which are represented in a plan view in *Fig.* 2. *e f* is the metallic rod, bearing the weight K K, with which the safety valve is loaded, and extending itself under that valve to *f*: *g h* is the *vacuum valve*, consisting in a plane circular plate, with a brass tube sliding along the rod, and pressed by a spiral spring to the safety valve *a b* (against which it has been well ground in making it), closing in that situation the openings *i i*.

Such being the construction of the whole, it is evident, that when the elasticity of the steam increases, the two valves, joined together, with the holes

i i shut, make but one, opposing to the elasticity of the steam an united resistance, which is regulated by the weight *k k*, in the common way; but, on the contrary, when by condensation of the vapours a vacuum is produced, the external air in pressing through *i i*, upon the vacuum valve *g h*, forces it down, and opens to itself a passage into the boiler.

The valve *g h* may easily be made conical, like the other, if that form should be preferred; but in different trials, I have found planes, if well turned and ground together, join as perfectly as can be desired, being pressed by the united elasticity of the spring and the steam.

Fig. 3 is the same contrivance adapted to a new kind of *safety valve* or *piston*, which, though I originally intended it for the use of Papin's digesters of a new construction*, has been, in a larger

* Nicholson's Journal, March, 1804.

size,

size, applied by me even to steam engines, and is described in the Philosophical Magazine of December, 1803.*

I have lately begun, and shall pursue, a set of experiments, with the intention of regulating by this safety piston, the quantity of admitted air to fire-grates, and to effect, by that means,

* The description of this contrivance being already published, it would be superfluous to repeat it. I only beg leave to add the following practical remark. A metallic piston, if well turned and fitted into a cylinder of exactly the same kind of metal, will probably have the same degree of expansion, especially if hollow, and consequently will not increase its friction in any increased degree of temperature. But as in practice the cylinder is commonly exposed to a lower temperature than the piston, heated by the steam, a little increase of friction will take place by an increase of heat. To prevent the effect of this, I have found it useful to employ for the piston a metal of somewhat less expansive powers than the cylinder: and the expansion of red copper being to that of brass nearly as 10 to 11, I prefer making the piston of the former metal, when the cylinder is made of brass.

a new

a new mode of regulating the fire, and the elasticity of steam in boilers, with less expenditure of fuel and of force than usual; of which idea a hint is given in the work and place above mentioned. The result of these researches, I shall at some future period do myself the honour of communicating to the Society.

The

The SILVER MEDAL of the Society and FORTY GUINEAS were this Session voted to Mr. GEORGE WALBY, of Goswell-street, near the Turnpike, for his Invention of a FORGE-HAMMER, with great power for working metals, and worked by one or more men occasionally.

An ENGRAVING and DESCRIPTION thereof are annexed.

The following COMMUNICATION was received from him.

SIR,

I TAKE the opportunity of laying before the Society a drawing, accompanied with a description, of a new-invented Hammer, for the purpose of forging bricklayers trowels, rounding of ships bolts, beating gold or tin foil, planishing brass, copper, &c. or for any other work in which a large hammer may be required upon a simple principle.

principle. The weight of the hammer is seventy pounds, which may be worked by one man, with the speed of three hundred blows per minute, with the greatest accuracy and ease, and it performs the work of two or three men. The steel is kept in better temper by this hammer, as it requires fewer heats in doing the same work than in the common way.

The trowels made by me with it will bear any pressure or bending, and return by their elasticity to their original shape, and they will even cut a chip from a bar of solid iron, without hurting their edge; they are lighter and more handy than common trowels, and serve much longer in use.

I am, Sir,

Your obedient humble servant,

GEORGE WALBY.

Near Goswell-street Turnpike,
April 20, 1803.

REFERENCE *to the* ENGRAVING *of Mr.* WALBY'S *Hammer-plate.* — *Pl. XIII. Fig.* 1 *and* 2.

Fig. 1.—A. A block of oak, in which the hammer acts.

B. The wheel or nave, in which the hammer-handle C is fixed, also the chains which give motion to the hammer by the quadrant D.

E E, Are the two levers which work the quadrant D.

F F, Are the two pedals on which the man who works the machine treads alternately, holding the levers E E in his hands; when he treads on the right pedal F, he lifts the hand-levers E E, which motion raises the hammer C; when he treads on the left pedal, he presses on the same levers, which motion lets fall the hammer.

G, Is a rack, which moves perpendicularly by the action of a strong wooden

wooden spring H, placed in a trough underneath the centre of the machine; the rack is kept close to the quadrant K by a bridge *a*, containing a small friction roller.

I. An additional steel spring, fastened to the ceiling over the machine, in order to assist the wood spring H, when fewer hands are at work.

K, Is the quadrant contained in the centre of the oak block A, under the nave B, which assists in raising or depressing the hammer by the alternate actions of the pedals F F.

L, Is a lever fixed on the axis of the quadrant K, which, at the time it depresses the rack G, pulls upon the hammer-handle C, by the chain M, which adds to the power of the blow.

N O, Are the two side levers to be worked by two men, when more power is required.

P P, Are

P P, Are other two pedals on which a man treads alternately, to give motion to the hammer, having an upright rod or chain to each pedal; one rod is connected from the right pedal P, to the lever O, which raises the hammer; the other rod, from the left pedal P, is connected to the handle of the hammer C; when the man treads on the left pedal P, he acts upon the hammer C, and, by lifting the lever O with both hands at the same time, adds double power to the blow.

Q, Is a wooden spring or stop, which prevents the hammer rising too high, and accelerates the fall.

R, Is a bridle, which supports the wooden spring Q.

S S, Are two iron standards, with holes in each, to raise or fall the said spring.

T, Is a wooden standard to support one end of the wooden spring Q.

V, Is

V, Is a steel tempered spring standard to support the hammer whilst out of action; it also gives ease to the springs, and prevents the heat of the anvil from softening the face of the hammer.

U, Is a solid block of oak on which the anvil stands.

W. The anvil, with a hollow dove-tail on the top for the reception of different faces, as the various kinds of work may require.

X. A steel face, dove-tailed in the anvil.

Y. A steel spring, which lies beneath the hammer-handle, but only touches it when the hammer falls: this spring, when the heated metal is laid upon the anvil, and in a soft state, prevents the hammer falling upon it with its full force. It gives a recoil to the hammer, and permits the workman to modify or shorten the

the stroke of the hammer with quickness, ease, and regularity.

Z. A weight hung on the arm of the quadrant K, in order to counteract the power of the hammer occasionally, when light work is to be forged.

Fig. 2, Is a bird's-eye view of the hammer-wheel, and is marked with similar letters, to show the same parts. 1. 1. Are chains by which the rack G raises the hammer. 2. 2. Are chains which raise or depress the hammer by the motion of the levers E E.

Fig. 3, Is a hammer-head, with a face let into it; and which face may be taken out and changed to suit different work.

Mr. George Walby's Hamme

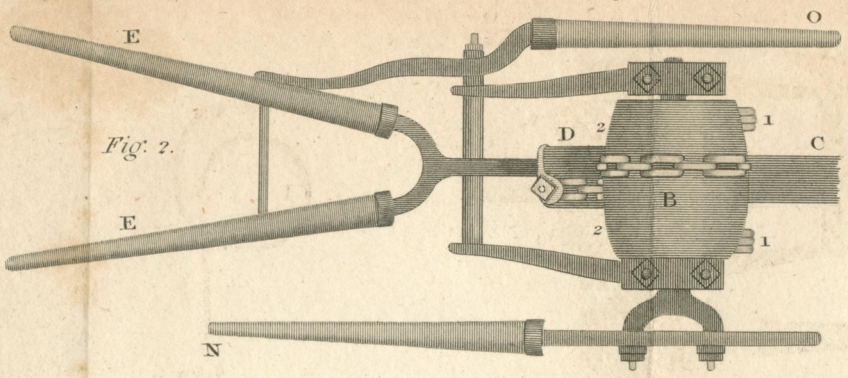
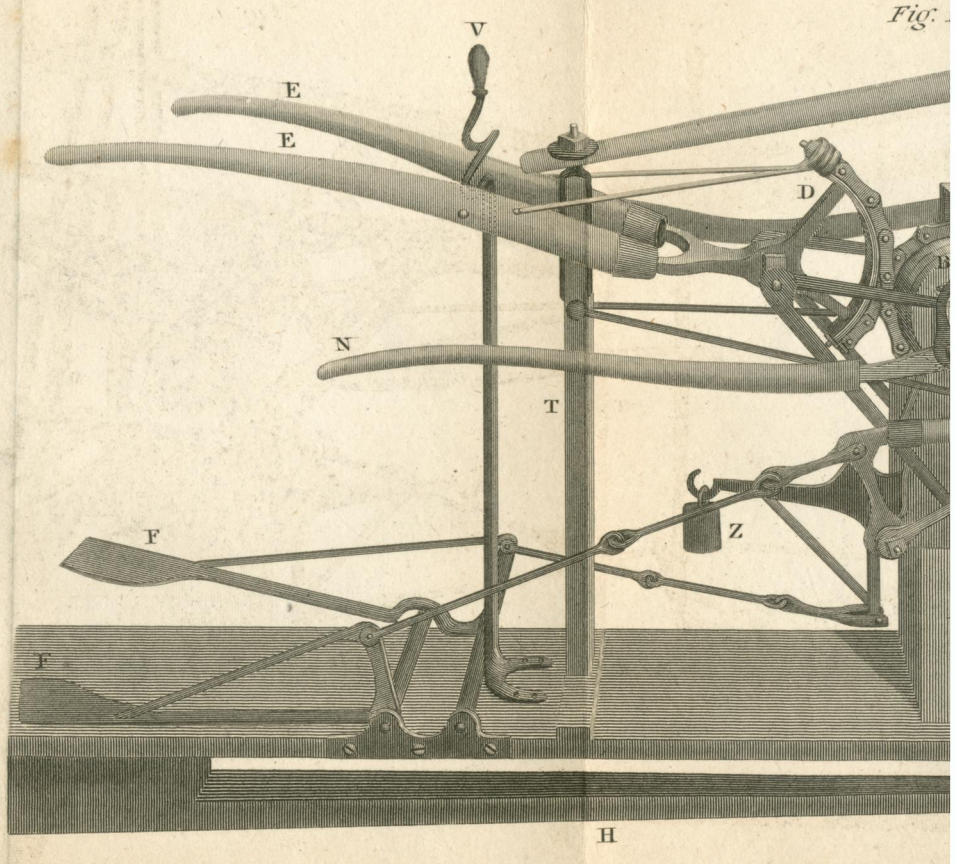


Fig. 2.

Fig.



C.Varley del.r

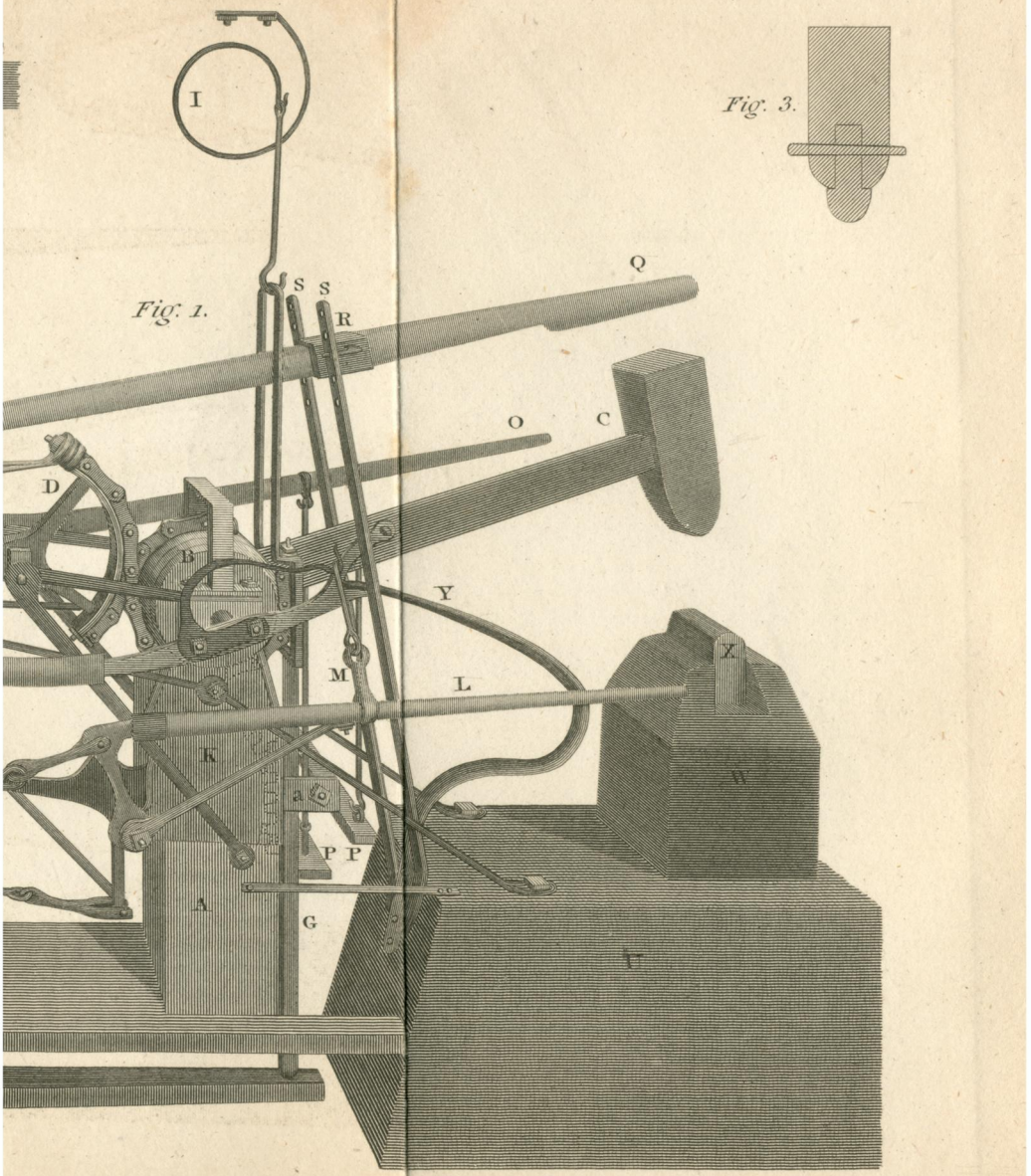


Fig. 3.

S. Porter sc. 4 Weston Street Pentonville

ERRATA.

Page 91—For *Curwan* read *Curwen*.

Page 325, line 6—For *steel pullies* E F G H, read *friction rollers* E F and *plates* G H.

Line 11—dele *on the underside*.

Line 12—dele *by the dotted arch*, and read *at*.

Line 16—For *part* read *the pivot*.

Line 17—dele *complete*.